TS Bulletin # 1-95

ENTIRELY, PROUDLY
WRITTEN BY~
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Ed. Says...

The newsletters have of late been appearing slowly and in fact no reduced i.e. small magazine type TS Bulletin newsletters have come put since the 1992 issues, in which the programming of machine code and POKE's inspired by the LDOS disk system was my interest of the day. The large-sheet TS Bulleting Supplements that appeared in 1993 and 1994, as well were getting into the big picture issues and higher systems matters, where last left off, and this newsletter follows up on those with an article on the next revolution in office computing, which tackles the trends in micro-computer application, along with an article on B. F. Skinner which deals with the question of intelligence in computers and psychology using the machine as a model of explanation. Obviously it is a thoght provoking hobby!

In order to continue our mix of articles we have also a hardware articles on power supplies, and disk unit and some programming featured too. It is hoped that more of the ZX-81 BASIC programs can be accommodated in this newsletter in the near future than the partial listings that have been customary to find here, although those plans must wait.

→ CONT. TOP NEXT COLUMN

Continued

It seemed like a good time to issue another small format newsletter in our series before another year goes right by, especially since there is much material, almost ready to publish in our files. It seems to always amaze me how fast time seems to go and hard to believe that two years have almost passed, since the last small-format newletter, but on examining the files, it seemed clear that it had. The question of of the relevance of user groups and hobby newsletters keeps being raised as each group that folds comes as another blow to our steady resolve. Well, it does not matter much, it seems, to this publication, so rather than announce some day that it is closing, it is more likely just going to fade away. But until then, some new ideas to organize it around have popped into the mind. What about publishing in a spirit of 'world perspective' articles that are not always in English? What about publishing some local history of computers or electronics history of Canada, as well as the current economic dilemma as one more, and hoepfully final, deep recession, starts to take hold next year. Certainly economic problems are not unrelated to the future trends and opportunities offered by computer and other technology. In fact it is a better time to discuss such higher systems level questions since computer systems are getting more sophisticated and computer questions are being discussed by more and more people. So in the end, the conclusion was obvious — there is lots more to write about, and it seems best to juat keep going on an issue-to-issue basis. Here's to our Sinclair hobby!

#※ NEW NAME? (FOR OLD N/L)
□ HOBBY COMPUTERIST
□ ARCHIVES OF...
□ TS & AMATEUR...
?.. OLD OR NEW TOPICS TO COVER?
* POSSIBLE TO SEE IN FUTURE

⇒ NEW FORMS of N/L

Some changes will be experimented with and that seems likely to carry us on when otherwise it might have been tempting to just wind up the whole thing. (Those who are not interested in the changes of course will not have them rammed down their throat. The mailing list I use will be adjusted accordingly but then, I do not do all the mailing, and cannot predict who else will send copies out and to whom.) WE SHALL SEE WHAT WE SHALL S - Who Knows?

WARNING: Written as a hobby by Bill J. Harmer, 97 Ruskin St., Canada who cannot guarantee the accuracy of anything expressed in it, but would appreciate in hearing of any errors you may notice. Do not modify your computer, build any hardware, make any commitment or send any money on the basis of anything published in this newsletter, without making your own verification to a completely adequate extent. Enjoy!

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An excerpt of the new edition of the author's book, "Tips and Tricks of the User Group Masters — for the Timex-Sinclair ZX-81/TS1000" (in preparation)

Television Sets And The ZX-81/TS1000

One of the advantages of the cheap home computers of the 1980's that used no more expensive screen display than the borrowing of a home t.v. set, was the simplicity of attaching them to the t.v. set with the little box and tv/game-computer switch inside it. The output was to what is called in the tv trade, 300 ohm twin lead (flat cable). Modern tv sets may only have a 75 ohm co-ax connection, (round shaft with screw threads to fit an F-59 connector, if you are buying one for a project). To adapt this to a tv set without the two antenna screws for twin-lead, an accessory adapter is sold at the bigger electronic stores, a sort of balun in reverse, the ordinary cable company connector to do the opposite of this, connect an old tv to cable, being called a "balun" transformer. To connect a new tv to the old twin lead, you need an adaptor that does the reverse. One of the often asked questions of the ZX-81/TS1000 would-be or new owner in the old days used to be if they needed or could use a colour tv set since the ZX-81/TS1000 was only black and white. The answer is a simple yes, since colour tv sets were originally designed to be compatible with black and white tv, except that a colour tv is not likely to be too good to use with any computer, since the picture will be fuzzy and just not sharp enough in the dots to render letters with their sharp edges. That is why colour monitors were employed, although with the big letters of the ZX-81/TS1000 in normal mode (not the 64-column mode of some accessories) which beg for a monitor. Monitors can be dealt with elsewhere. The typical ZX-81/TS1000 was designed for use with European PAL and SECAM tv sets, although the internal wiring must be changed, and not all internal modulators will work, the type of tv/modulator connection verying with some ZX-81/TS1000's differing from others.

UHF or VHF or Direct Video?

When manufactured, the ZX-81 was usually equipped with a UHF output so that you need a tv with UHF band, and need to connect the output from the computer to the UHF (not the VHF) antenna terminals at the back of the set. For the ZX-81's and TS1000's that came later, most had a VHF modulator, and some had a switch underneath to select from channel 2 or 3, (to get around the problem of interference of a strong local channel on one or the other of those channels). Some seem to have had VHF but no channel switch. Others have been modified by the previous owner, and bould have any imaginable connection, this usually being accompanied with the installation of the ZX-81/TS1000 in a special case with a nice keyboard. The commonest modification is to add a co-axial cable terminated with a phono-plug, also called an RCA-type plug, you know, the one with the big round centre pin and segmented cylinder style over-leaving outside connector. All ZX-81/TS1000's originally came with a cable that has such a connector on both ends, for computer-to-switch box on tv, but the user should be warned that such cables were frequently abused , stepped on, heavy equipment rested on them, etc. and are a frequent source of problems, that is the connections have become disconnected inside the cable. If you have a video problem, especially an intermittent one, this is one source to expect, (another, the computer/tv switch and a thrid the tv channel knob, which in most tv sets will not like being kept on one channel all the time, and loosen its connections and drop out to a white screen on you). The solution is to substitute a good cable, switch the switch back and forth, and give the tv tuner-channel knob a rotation, (and never leave it on the same channel twice, when not using it). So, if a non-standard cable emanates from the innards of a metal-cased ZX-81/TS1000, it is most likely a direct video connection, made to connect to a composite monitor like the old green or amber screen Zenith models sold in the 1980's for IBM and CP/M personal computers. A few black and white tv sets also had a switch on the back for direct video, especially the ac/dc models. Now, more a and more tv sets or VCR's have a direct video input as well, that will allow you to get direct video onto a tv screen. Direct video can be connected to tv signal by the use or a modulator, and these are sometimes sold in electronics stores, the Radio Shack catalogue carrying one even in the 1990's. A modulator needs a power supply however, something worth noting if your are thinking of adding one. It is not self-powered orlike a passive interference filter.(Cont.p.7)

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Famous Mainframe Computer Software: Line Editors

One of the pieces of computer software that most users of old mainframe computers will have encountered, is the line editor, a primitive text editor program, a predecessor of both full-featured word processors and the full-screen editors that computer hobbyists are used to in home computers, (and usually used to edit BASIC programs, or the BASIC command line). The old line editor was justly famous, not for a good reason but a bad; it was simply a frustrating piece of software to use. Fortunately, it was quickly bypassed by the evolution of better text editors by the time the home computer started to become a mass-market item, so few home computer users have had much of a run in with it.

So, it is necessary to take you to a session in the 1970's or earlier, with you, the young student, sitting down to a video terminal (or old teleprinter terminal), faced with a deadline, and confusing instructions on how to use it and you type a line, "This is a test.", and hit the enter key. Then another line, "This is easzx", and hit the enter key for that line. Then you say, "Oops, made a mistake," and try to correct it. You look at the commands and realize that you must get into command mode. You find a control key like "Escape" will do that. Unfortunately, you are into a new screen now, and the rest has scrolled far enough, that you want to display what is there. Try the command "L" for list, and the computer takes it, and lists nothing. Problem is, the list will list a page of lines, after where you left off. There is an internal variable in the program that points to which line you left off at. How to reset it to the first line of the program? Try the'up' command. Still nothing. Of course it moved the last line, but does not list it, so you enter the L for list command again, and again nothing. The UP the pointer to the current line up one, but the list moved it down one again, so when you went to list again, you got nothing. Eventually you find that a command like B for bottom (or begin) moves the cursor-line pointer all the way to the top, or was B for bottom, I forgot. Anyway, after a good three hour session while others wait to get their hands on your terminal, with varying degrees of patience, you have managed to save mostly unknown garbage to your file in the main computer storage area. And of course, it is not by the end of the session, but a long, long time later, that you realize what could have gone wrong and come to the point where you can explain what must have gone wrong.

The writer had his initiation as an evening student on a terminal at college to what was practically a super computer, running XENIX. Others will remember first frustrations on other hardware. But those who critisize the CP/M editor, ED, or the MS DOS editor EDLIN, will not likely appreciate how those editors were big improvements. Such line editors have three parts, or modules — a one-line-at-a-time line enter function, a command interpreter to take your commands like "d", to delete the line the line-pointer is pointing to, and a set of subroutines to do the actual low-level editing, data (text) moving and slicing, etc. To put it mildly, working with such an editor required a lot of skill, and memorizing both commands and what they did (and did not do) as well as keeping a mental eye image of where the current line is (the line the line pointer refers to) and where the disjointed display of lines shown on the screen fit into the whole text. Getting such features as word search and search and replace must have made such line editors seem like a great improvement at the time to data processing professionals. It is just that now, we have so much more and available so much more easily with screen editors and word processors.

In the middle of the early home computer era, home computers switched from editors based on the earlier line editor type to screen editors for their use of the BASIC operating system command line and BASIC programs, the dividing line in for example Commodore computers coming between the line-edit type VIC-20 and the screen edit type, Commodore 64, the latter also followed in IBM PC/MS DOS BASIC versions at the beginning (BASICA and GWBASIC). The early BASIC editors used the line-at-a-time approach at least partly, because ASCII lines stand alone, a feature of BASIC language itself that resulted in part from its use in terminals with multi-user computers and in part in a tradition of breaking a program into lines that goes back to unit record type input/output of punched cards with FORTRAN. But they differed from the old mainframe editors for text in that they automatically placed updated lines on the screen (normally) and also lacked the complicated edit commands. (Unfortunately a variable search and replace might have been good in BASIC and variable table listing, etc. but BASIC fell out of favour as a programming language around the time such programmer-friendly features started showing up in BASIC dialects.)

So that is the ancient history of line editors. Let's be happy they're history!

B.F. Skinner And The Computer Hacker

With the passing of B.F. Skinner, the American psychologist known for behavioursim, it is probably a good time to mention his relevance to the spirit of our time as represented by the way working with microcomputers has affected the way we think about thinking. Prof. B.F. Skinner seemed to want to take 'thinking' as an explanation of why people do things, right out of psychology. He wanted a psychology that in explaning a person's reason for doing anything, would call only on descriptions of his behaviour as observed by an external, impartial observer. He did not trust the often vivid descriptions of the ideas going through people's heads when they did this or that, as being useful in explaning their actions. He believed that these ideas were an appearance of things being decided rather than the real seat of decision, a by-product of the real determining factors. He hoped that the real determining factors were much deeper and more describable by laws similar to those of physics, and his unique contribution to the psychology of behaviourism was to propose a deep-seated type of conditioning, operant conditioning, a sort of association that determines behaviour ultimately regardless of the ideas going through our minds on the surface, while it is happening. Our body goes along the tracks of this operant conditioning and our ideas no more determine its course than the screams of a roller-coaster rider. Our ideas and vivid sensations just go along for the ride of life and like a roller coaster rider, have no hands on the control levers of our life, psychological(life)or otherwise. (In a strange twist some Freudians who also believe in deep unconscious factors prevailing over surface, rationalisms, also bought into behaviourism, at least in the U.S.)

In a world of the 1950's, the heyday of this type of psychology, control mechanisms seen in the machinery that was the model for this kind of mechanistic, materialistic thinking, the control mechanisms of say the guns and missles of the day (and B.F. Skinner worked on pidgeon guided missiles), were simplistic, analogue computers at best with only a few factors serving as input data for their 'computing'. In today's world, where even a simple, orphan home computer can be programmed to take into account hundreds of factors and run them through complicated equations of an arithmetic or Boolean kind in long complicated sequences of instructions through almost infinite loops, it is a little harder to be convinced of the existence of simple laws, unrelated to hard thinking and logical processes, as the way that human beings solve problems in the real world. We do not solve these problems by using long equations or Boolean expressions, juggled in our minds like absent-minded mathematics professors, splitting our attention between the calculations in our head and the world whizzing by in front of our noses. But it would seem to most of us who work or play at computer programming that the human mind in a problem solving situation will revert to some sort of rough and ready, abreviated or trial and error approach to solving the problem using logic of a less formal type than the straight Boolean of computers. Nonetheless it is based on the same logical features of the world and events and can just as easily be simulated simplisticly by a computer set up with a program to run the problem by solving a series of Boolean or arithmetic equations. The computer is much more determined by the formal details of how the equations are set up and happily will do what your tell it, going by form only, rather than what you meant to tell it to do. But is would seem that both the computer and the human being have come to grips with the logical relations between events in the world, use them to make decisions, and use the decisions to choose between alternative actions. Leaving the logical, mental decision making process out of psychology would seem to our generation, the first to get into the nitty-gritty of computer use at the lowest, most nuts and bolts level of understanding, to be an oversimplification of the laws of behaviour either human or that of the new computer controlled robots. On the passing of B.F. Skinner, this is his epitaph, that his life saw changes in science and machines so radical that never again would a human generation compare a person to an unthinking piece of steel or a biological function like a reflex.

But again, B.F. Skinner simply put a once new twist on a school of psychology that goes back very far indeed (beyond Henry Regius, contemporary of DesCartes and Spinoza). That school would replace the often frivolous attribution of our life's destiny to decisions taken on 'feeling a whim' oblivious to the complicated and deep-seated forces within our being and in the external world that pull our strings more than we care admit. Behaviourism in some brands already has the seeds of new complexities, organismic variables, and possibly context analysis. It is not dead.

The Next Revolution In Office Computing And How To Be Ready For It

It is getting hard to remember when the clicketty clack of electric typewriters was the only way to get text out of an office or around in the form of inter-office memos. Today, a lot of text never touches paper, and indeed in some offices these days, hit by economic pressures, there is a move to reduce paper use as much as possible. Today's office is built on doing as much as possible, typing (or keyboarding as it is now referred to), only once. This is starting to result in more of the work that typists used to do, perhaps not even needing to know spelling, being done on a level of intelligence of computers that can check spelling and catch some grammar mistakes too. This saves human checks for the editing of documents on higher and more subtle levels. If scanners and voice-input word-processors are just around the corner, the bottom level of this process, the manual keyboarding, may also be cut to a fraction of the work it now provides. That means that although the reluctance of businesses to spend on new hardware and the lack of need for it, with business generally slow, may delay it, the largely female staff doing this work now should be looking to learn new levels of skills that will enable them to survive the shake-up and redundancies that will inevitably come. Many will try to move into accounting using spreadsheets, some into data work as well as the higher level editing and administration. It would also be a good idea to get into the theory of use of computers, low level and high level now since those most affected will have little time when this transition comes. It is time right now to start understanding some of the finer points of computers—as well as English and other business subjects.

That raises an interesting point in that while computer user group membership may be valuable in this upgrading, as many women are finding, there seems to be a gap in the line-up of educational materials available for this upgrading. In order to search for ways of filling this gap, of ways to explain low level disk file and data structure and operations in terms for someone working in an office and not particularly technical or electronic oriented, this writer has been looking into the sort of concepts and material to use. Why not pick common things in an office to use in these explanations, rather than try to build up a vocabulary of technical terms like bit and byte, track, cylinder, etc. from scratch? Maybe one of my early attempts at writing this sort of low level explanation of today's computer systems, could be presented in a future newsletter issue. To ready it for a real book the text would have to be spread more thinly among more pages and alternated with more drawings by way of illustration, of course, but we will see.

For writers, managers and computer users of a more casual level, this looks from here to be the sort of material that will be needed more and more in the future. It is hard to have confidence in this material being done well in the future when major books by major, well reputed writing groups and publishers, will plunk down in the middle of an explanation of low level data structure, a few statements of things that just are not so. That means if experts or hacking enthusiasts are not going to be writing this a lot of what will be written will be worse than uselsss; it will be misleading, and lead to discouraging those who should be studying this sort of material. It will also be untestable, if simply stated in prose in a book. So what we need is both explanations in text and ways of testing them. Since low level hacking is too hard for the average student, that means putting data handling exercises into some sort of computer program routines, like BASIC.

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The Revolution Begins - Data By Wire Comes Before Data By Voice

Technology is accepted or rejected on economic grounds and today, we might well ask, why we should worry about new types of automation sweeping into the work world, when increases of automation are driven by the economics of labour scarcity, something that the current recessionary times are not characterized by? One answer is that companies and governments will continue to make economies in labour use that save money, and are easy enough to plan. What this means is that existing technologies are likely to be pushed further, even if newer ones that would require a whole new range of equipment are not. Compatibility is the watchword for economy now and those who can quickly learn a new piece of software for an old type of computer like the IBM PC compatible. will be employees worth their weight in gold. They have what in computers is called 100% compatibility.

Voice-input word processors that merely need dictating to, may be ten or twelve years away from replacing very many desktop, keyboard-based computer applications, and of course will never replace them all, although transforming them is likely. The big revolution that might eliminate some more jobs and change the average job is the method of computer input that goes by wire rather than by hand, networking in other words. That means that the concepts of network data sharing, filtering and translating, as well as the protocols of transmission, would be the next concepts to look at for low-level computer concept courses. Data structure and the way data files are broken into blocks, similar to disk files being broken into sectors for saving on disk, would be a good concept to employ to judge a book on, as to whether it really gets down to the low level or skips across the top.

The IBM Floppy Disk Drive - An Industry Standard and IBM Success Story

The IBM research and development staff invented the hard disk, at first using a stack of platters that could be removed, and later hermetically sealing the stack of platters inside, since the magnetic area used, both track width and length along it, to st e one-bit, of binary information was so reduced in size that even tiny dust could interfer with while sequences of bits, obliterating them when squashed into the disk by the read-Write head. But this reduction in area taken to store a bit of data was reduced, in the floppy disk drive, which held a lot less data, due to not storing it so dense! presented other problems due to the density, even relative, of data bits on a floppy disk. It meant that read-white heads became very small, and the gap in their combination horseshoe magnet and magnetic reading sensor, (a sort of coil pick-up, using the same core as the electromagnet in horseshoe form). In older disk drives, this gap gets clogged with dirt and may need very carefully and according to a definite technical procedure designed to avoid damaging permanently the e easily damaged, tiny surfaces. The fact that disk drives of the floppy kind went up in capacity over the years, meant closer spacing of which in turn meant that the mechanical parts of the disk needed to be made with greater preceision, and that failing to be enough, (from the start) some form of electronic or electrical synchronization or feedback to keep the reading steady and precise was also used. This explains why every disk drive mechanical unit also has electronics on it, (one or several printed circuit boards full), these circuits doing more to further precision of the read-write head, being over the right spot on the tracks of the disk and the right instant.

Three electronic solutions have been adopted. One is to make sure that the electric motor rotating the disk, (the hub motor, usually under the drive), rotates at a precise speed and not jerkily. A jerky rotation would be expected normally, since the electromagnets get pushier when they are nearer, and in a simple motor of a cassette recorder, there may be only three electromagnet poles acting as points to push off from, as the motor rotates. Obviously that is not good enough. The first IBM 8 inch drives, the least dense, used an electric motor with fewer poles that later hub motors, the newer ones having many wire paris exiting the, one for each set of poles). The first IBM drives, (8 inch) also used a 60 Hz a.c. motor to synchronize the motor speed, something similar to the way an electric clock keeps time, when plugged into the a.c. at 60 Hz in the well. Later models relied on the electronic circuits to produce these pulses, and produce them in a precisely timed way. These circuits also used feedback, to sense the real speed with sensors inside the hub motor and apply a little longer pulse or more energy, if needed, and exactly the instant it is needed. So the newer disk drives using higher density of more bits per inch, used motors that were synchronized by shorter and so more accurate pulses, (and more of them) and also used feedback to operate motor speed controller electronics of more and more precision and electronic sophistication.

The 8080/Z-80 computers like the Osborne I that used CP/M operating system, (an early predecessor of MS DOS, inspired by the file structure of DEC OS/10 for minicomputers), employed the IBM 8 inch floppy disk drives (or rather two of them, one for the system disk now usually put on the hard drive, hard drives being to expensive to use then in personal computers). These computers also used the exact same format as the IBM mainframe computers used for floppis, i.e. size and placing of sectors, tracks etc. When the IBM 5 ¼ inch floppy drives started to become available, personal computer designers tried their hand at using their own innovative formats, differnt numbers of sectors or no sectors at all, boosting the original 320K byte DSDD IBM format of MS DOS version 1.25 to in the case of some Atari computers, 440 Kbytes. Some systems did not use sectors at all, some used variable size sectors, some like the Commodore 64 put more sectors on outer tracks than inner, and placed the directory track in the middle of the concentric rings of tracks rather than the outside (as in MS DOS and IB PC microcomputers). Of course the result was a compatibility problem among disks written by different computers, sometimes just due to the operating system software, but sometimes also depending on the existence of special disk drive controller hardware, (as in the non-standard Apple II, 5¼" floppy disk format, unreadable on an IBM system). But in spite of the hassle, the IBM 5¼ in. IBM designed floppy drive revolutionized home computing!

(Also SEE illustration page 7 →)

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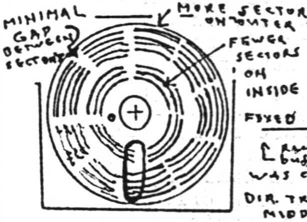
DISK FORMAT FACTORS

Method of conserving disk media area in

Some 6502 home computers

CIRCA 1979



FIXED BYTES PER SECTOR [RAM buffer] WAS COMMONEST

DIR. TRACK IN MIDDLE OF DISK!

One system actually used varied sector lengths in bytes but most used sector of one single, fixed length like IBM, but different number of sectors in outer tracks to more completely use their capacity (Radio Shack CoCo BASIC/Commodore 64).

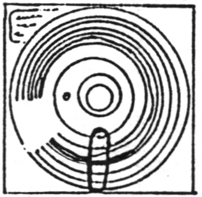
SOME 6502 Disk Systems INCLUDED DISK CONTROLLER ELECTRONICS TOO!

GOAL - Maximizing disk capacity in an era of single-density, mechanically sloppy disk units. Tended to be slow. Handled both BASIC and data files, of variable length. When double-density drives became common, the capacity per disk was increased dramatically.

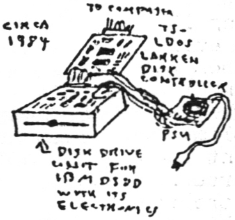
Microcomputers of the more expensive kind used operating system/prog. language compilers, etc. kept on disk, a floppy disk drive (drive A or drive 1) substituted for the hard drive of mainframes and modern MS DOS computers, since they were too expensive for home computers then. Home computers economized by placing the BASIC and operating system on the then new, silicon chip ROM/EPROM chips.

THIS WAS THE ORIGIN OF THE SYSTEM DISK.

Early Larken disk system, TS-LDOS, one that simplified software for i/o.



CIRCA 1984


TO COMPUTER
TS-LDOS LARKEN DISK CONTROLLER
PSU
DISK DRIVE UNIT FOR IBM DSDD WITH ITS ELECTRONICS

NO SECTORS! EACH CYLINDER/HEAD POSITION USED FOR TWO CONTINUOUS BLOCKS (TOP, SIDE 0 & BOTTOM, SIDE 1)

The result was a lean system, and sector access could be added in later systems (LKDOS), by simply leaving gaps in the blocks where ends of sectors would normally be.

GOAL-Economical of programming and hardware design, Advantages turned out to be speed of access and reliability of operating system i/o. Needed to save 16-32K of BASIC program and not get in the way of programs by using main RAM for disk i/o buffers, etc. Operating system extension, for disk i/o used ROM (EPROM) on the disk controller pc board.

SOME OLDER MICROCOMPUTER FLOPPY disk systems are a good point to see the ways some early experiments that tried to stretch the disk medium capacity, showing that the fixed number of sectors and fixed sector length method of IBM is not the only possible floppy disk format layout!

LIST OF FILES IS ON DIR. TRACK which is ON OUTER TRACK(S) IN LDOS, LKDOS, CP/M & MSDOS

A CHOICE OF OPERATING SYS SOFTWARE DESIGNER

CP/M & IBM/MS-DOS were designed around an ASCII file structure, and needed to be able to handle these variable length files by chopping them into small, fixed length parts, i.e. sectors.

INSIGHT from OUR TS HOBBY!

Text & Technical Sketches by Bill, MAY 95

TS BULLETIN #1-95 PUBLISHED MAY, 1995, FIRST TIME (ORIGINAL ART)

Continued from p.2

and different modulators are made to run off different power supply voltages. The funny thing is, the way that although a modulator in theory needs the direct video to work from, in practice, it may simply run off an already modulated signal, for example, a v.h.f. modulator, taking as input the u.h.f. modulated output of an older ZX-81/TS1000, may work! Something about cross-modulation of sidebands or residual baseband video; the theory does not matter, really. If it works, it works. Trying to extract or even invert baseband video from modulated video, is like attempts to add a direct video jack to a tv without one, frought with extreme technical complicatedness and expense. Some plans have been publish-in old electronics magazines for projects to extract direct video from the ordinary, modulated output of a ZX-81/TS1000 and the reprocess it, but they seem to involve too many parts for my liking. But there it is. Video for the masses

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In your computer room you likely have two of the most easily damaged consumer electronics products imaginable, the computer monitor or t.v. set (if you are using one instead of a monitor) and the computer itself. They can be damaged permanantly or their operation interrupted by interference coming in on the electrical company power lines from a distant lightning storm, or just variations of their voltage level outside in source or inside your building, electric motors starting in air conditioning or heating systems being examples of the latter.

You may see this on the screen as the bright area of the screen of your t.v. set or monitor momentarily gets smaller, or blinks. You may find that it caues your computer to 'crash', that is lock up and not accept any further input, this most often caused by one of the machine language instruction having one of its binary bits changed from a 0 to 1 (or the reverse) making the good instruction into one that calls on the computer to do something impossible or nonsensical. This is caused because all the binary bits in a computer are stored in the form of higher or lower voltages (usually around 4-5 volts for a high, 0 to 1 volt for a low), and any significant change in the voltage level at certain parts of the circuit at certain times can cause their values to change. This can turn true into false, males into females (in data) and good machine instructions into meaningless ones asking the computer to look at a part of memory that does not exist on the particular computer, this completely flumoxing most computers which cannot figure out what has gone wrong, and like a mechancial toy going over the edge of a table, plunge on to their doom, dumb and obedient to their machine programmed nature.

On the older home computers like the Commodore VIC20 and Timex-Sinclairs, the power supply was based on a sine-wave, step-down transformer, which reduced any voltage variation or spike on the 120 volt electrical company electricity to about 10 volts, on the way to the 5 volts of most internal computer logic (TTL levels, as they are sometimes called). With the Apple II and IBM PC and clones, designers turned to using power supplies that employed not the nice, smooth, round sine waves that the electrical company provides, but short, raucous and rough switched on and off spurts of electricity, and these switching power supplies will not tolerate a lot of problems on the 120 volt power, including especially voltage spikes from distant lightning storms The reason is, if the switching gets out of the ordinary range, such a power supply as the switching type will step up the voltage instead of stepping it down. Of course their are other more technical possibilities to detail in any full explanation, but basically the switching power supply makes for lighter, more energy efficient power supply boards but less reliable, and electrically more fragile. So the newer computers are more fragile electrically than the old home computers, and if you are operating on advice received in the days and for the computers of an earlier type, ("I never turn my computer off," one user running a BBS said), then maybe you are setting yourself up for a fall. My advice would be to never run a computer during a lightning storm, especially a newer type.

Electronically, there are too fixes for this problem of momentary over-voltages. One is to add an MOV transient suppressor, and this is what you are doing when you buy the power line spike suppressors to plug your computer into, before the power line suppressor is itself plugged into the wall. In the cheaper ones, that may be all that is inside them, one or two MOV's, and in the cheap ones, if you are not using a three wire wall/etc. plug, you may not be getting any protection, because to save money often the MOV may only lead to the third, ground, wire, and if that is not connected to ground in the wiring of the building, then it is simply disconnected all the time. More expensive spike protedtion units have a choke for other interference, and some devices to apply MOV protection to modems also are sold now, as the telephone lines can also carry damaging voltage spikes.

The second method for keeping the voltage from going up too far, is the voltage regulator circuit, and all microcomputers have them inside somewhere. Of course they may not be enough, and other devices like the MOV circuits may be needed too.

Then there is the t.v. set and computer monitor, each with a CRT, (picture tube). These picture tubes need a very high voltage to work, and inside them is a high voltage section, which steps up the voltage at least ten times from 120 volts or so, and uses a flimsy wire wound transformer to do it. That makes such CRT-dependent units very prone to permanent damage when a voltage spike comes in on the power cord. They also, like the switching power supply, use an odd shaped wave rather than the nice, smooth sine wave, making them especially vulnerable for that reason, and if the high voltage transformer does not blow, the transistor driving it will likely.